World Health Organization
Growth Standards

BC Training Module
Appendices

August 26, 2014
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Case Study Scenarios & Answer Guide

Instructions:

The following case studies were developed to support health care providers:

- to select and plot on the appropriate growth chart
- to interpret results
- to identify client follow up and when to refer for growth concerns

Each case study includes:

- a scenario describing a child’s growth including available serial measurements
- questions addressing what chart(s) to choose, how to interpret the child’s growth, and actions required
- answers for discussion

Steps to complete the scenario:

1. Select the appropriate growth chart(s)
2. Plot the measurements
3. Review the scenario and measurements
4. Interpret the results by identifying whether growth is a low concern, moderate concern, high concern
5. Identify additional information that you would consider from the suggested list on slide 28
6. Identify how to monitor growth in this child and actions required including possible anticipatory guidance for parent/caregiver

Note

The following case study scenario answers are based on the case study of growth measurements and information provided. The interpretation of growth in a real life situation may differ from what is presented here based on additional information collected and professional judgement.
Case Study #1: Baby Jasper- 6 months old

Baby Jasper was born term, measuring 52 cm in length and 3600 g in weight, with an unknown head circumference. He was breastfed until 3.5 months and then switched to formula. He takes approximately 700 ml of formula each day. Jasper has been increasingly fussy and is difficult to settle. His 42 year old mother is a primipara and is very upset and worried. She states he has a dirty diaper only about every 5 days now but he has a wet diaper about 4 times each day. She has tried feeding him cereals and pureed vegetables but he seems uninterested. She sometimes puts a bit of cereal in his bottle. Jasper’s measurements are as follows:

<table>
<thead>
<tr>
<th>DATE</th>
<th>AGE</th>
<th>LENGTH (cm)</th>
<th>WEIGHT (g)</th>
<th>HEAD CIRC. (cm)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-03-15</td>
<td>Birth</td>
<td>52</td>
<td>3600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010-05-20</td>
<td>2 months</td>
<td>60.5</td>
<td>6000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010-07-14</td>
<td>4 months</td>
<td>65</td>
<td>5900</td>
<td></td>
<td>Formula initiated at 3.5 months</td>
</tr>
<tr>
<td>2010-09-21</td>
<td>6 months</td>
<td>66</td>
<td>6100</td>
<td></td>
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</tr>
</tbody>
</table>

1. Which chart(s) would you use to monitor growth?

2. What pattern of growth are you seeing in this child?

3. How would you interpret the growth curve?

4. What additional information would you consider?

5. What conclusions would you draw from the measurements and pattern of growth on the growth chart?

6. How would you monitor growth and what actions/next steps would you take?
Case Study #1: Baby Jasper - 6 months old

Answer guide:

1. Which chart(s) would you use to monitor growth?
   Boys – Birth -24 months Weight-for-Age and Length-for-Age percentiles
   Boys – Head Circumference and Weight-for-Length percentiles

2. What pattern of growth are you seeing and how would you interpret the growth curve?
   **Length -for-Age** shifted from the 50th to the 15th percentile over six months.
   **Weight -for-Age** shifted from the 50th to the 3rd percentile over six months.
   **Head circumference** – no measurement taken.
   **Weight-for-Length** showed a rapid shift from the 50th to below the 3rd percentile in a two month period of time.

3. What additional information would you consider?
   • Information from slide 28
   • Assessment of developmental milestones
   • Query of previous physician assessment and if so any diagnosis or additional medical information
   • Level of hydration (output), frequency of feeding throughout the day

4. What conclusions would you draw from the measurements and pattern of growth on the growth chart?
   High concern for growth: The growth curve on all charts show a sharp decline in a short period of time. Weight-for-Length has crossed two major percentiles.

5. How would you monitor growth and what actions/next steps would you take?
   Monitoring: Frequent; Referral to family physician for medical investigation of growth failure/failure to thrive is recommended.

   Anticipatory guidance:
   • Recommend parents see physician for medical investigation.
   • Screen with Edinburgh Postpartum Depression Scale to identify if postpartum depression.
   • Provide anticipatory guidance for introduction of solids and feeding relationship.
   • Provide anticipatory guidance for care of mother as well as for infant.
Appendix B

Case Study #1: Baby Jasper - 6 months old

WHO GROWTH CHARTS FOR CANADA

BIRTH TO 24 MONTHS: BOYS

Head Circumference and Weight for length percentiles

Name: ___________________ DOB: _______________ Record #: ________

Head Circumference

Weight

Length

Gestational Age at Birth: _______ Weeks

Date: _______

Length: _______

Weight: _______

Head Circum: _______

Comments: _______

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Source: Based on World Health Organization (WHO) Child Growth Standards (2006) and WHO Reference (2007) and adapted for Canada by Canadian Paediatric Society, Canadian Paediatric Endocrine Group, College of Family Physicians of Canada, Community Health Nurses of Canada and Obstetrical Canada.

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Case Study #1: Baby Jasper - 6 months old
Case Study #2: Baby Shania- 8 months old

Baby Shania was born at term, measuring 50cm in length and 3200g in weight, with a head circumference of 36cm. She was breastfed exclusively from birth until solids were introduced at 5.5 months. She is active and vocal. Shania’s measurements are as follows:

<table>
<thead>
<tr>
<th>DATE</th>
<th>AGE</th>
<th>LENGTH (cm)</th>
<th>WEIGHT (g)</th>
<th>HEAD CIRC. (cm)</th>
<th>COMMENTS</th>
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<td>36</td>
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<tr>
<td>2010-05-20</td>
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<td>64</td>
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<td>8 months</td>
<td>66</td>
<td>7200</td>
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1. Which chart(s) would you use to monitor growth?
2. What pattern of growth are you seeing in this child?
3. How would you interpret the growth curve?
4. What additional information would you consider?
5. What conclusions would you draw from the measurements and pattern of growth on the growth chart?
6. How would you monitor growth and what actions/next steps would you take?
Case Study #2: Baby Shania- 8 months old

Answer guide:

1. Which chart(s) would you use to monitor growth?
   - Girls – Birth -24 months Length-for-Age and Weight-for-Age percentiles
   - Girls – Head Circumference and Weight-for-Length percentiles

2. What pattern of growth are you seeing and how would you interpret the growth curve?
   - Length-for-Age shows a gradual shift from the 50th percentile to below the 15th percentile.
   - Weight-for-Age shows a gradual shift from above the 50th percentile to track along the 15th percentile.
   - Head circumference was at the 97th percentile at birth.
   - Weight-for-Length shows a consistent pattern of growth between the 15th percentile and the 50th percentile from 6 months onwards after an initial downward shift at 4 months.

3. What additional information would you consider?
   - Mother’s height, father’s height and size
   - Genetic and cultural background
   - Child’s health status or recent illness
   - Infant feeding method and nutritional intake
   - Family feeding patterns
   - See slide 28 for further information

4. What conclusions would you draw from the measurements and pattern of growth on the growth chart?
   - Low concern for growth: Measurements on all charts indicate variability in growth pattern is normal. Although Length-for-Age and Weight-for-Age charts show a shift in one up to two major percentile curves, the change took place over a long period of time and is considered normal in the first two years of life. Weight-for-Length growth curve indicates child is growing consistently and Weight-for-Length is proportional.

5. How would you monitor growth and what actions/next steps would you take?
   - Monitoring: Routine
   - Anticipatory guidance:
     - Refer to Dietitian services at HealthLinkBC (8-1-1) for support for eating and feeding practices
     - Parent resources for additional information
Appendix B

Case Study #2: Baby Shania - 8 months old

WHO GROWTH CHARTS FOR CANADA

BIRTH TO 24 MONTHS: GIRLS

Length-for-age and Weight-for-age percentiles

NAME: ________________________
DOB: ________________ RECORD # ______

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Case Study #2: Baby Shania - 8 months old
Case Study #3: Baby Lauren - 12 months

Baby Lauren was born term by caesarian section, measuring 51.5cm in length and 3609g in weight, with a head circumference of 34cm. Her mother is a healthy primipara; and no familial risk factors were identified. She was initially breastfed and then switched to iron enriched formula by two weeks of age. She was introduced to solids at 6 months as per recommended feeding guidelines. She was seen at Well Baby Clinic. Lauren’s measurements are as follows:

<table>
<thead>
<tr>
<th>GESTATIONAL AGE AT BIRTH</th>
<th>38 WEEKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE</td>
<td>AGE</td>
</tr>
<tr>
<td>2009-08-05</td>
<td>Birth</td>
</tr>
<tr>
<td>2009-08-08</td>
<td>Discharge</td>
</tr>
<tr>
<td>2009-08-12</td>
<td>7 days</td>
</tr>
<tr>
<td>2009-10-09</td>
<td>2 months</td>
</tr>
<tr>
<td>2009-12-11</td>
<td>4 months</td>
</tr>
<tr>
<td>2010-02-12</td>
<td>6 months</td>
</tr>
<tr>
<td>2010-08-13</td>
<td>12 months</td>
</tr>
</tbody>
</table>

1. Which chart(s) would you use to monitor growth?
2. What pattern of growth are you seeing in this child?
3. How would you interpret the growth curve?
4. What additional information would you consider?
5. What conclusions would you draw from the measurements and pattern of growth on the growth chart?
6. How would you monitor growth and what actions/next steps would you take?
Case Study #3: Baby Lauren - 12 months

Answer guide:

1. **Which chart(s) would you use to monitor growth?**
   - Girls – Birth -24 months Length-for-Age and Weight-for-Age percentiles
   - Girls – Head Circumference and Weight-for-Length percentiles

2. **What pattern of growth are you seeing and how would you interpret the growth curve?**
   - Length-for-Age shifted from the 85th percentile to the 15th percentile over a 12 month period.
   - Weight-for-Age was initially at the 85th percentile with weight shifting to just below the 50th percentile around four months of age. A slow rebound shift is occurring where Lauren plotted between the 50th percentile and the 85th percentile at 18 months.
   - Head Circumference was at the 50th percentile at birth.
   - Weight-for-Length growth curve tracks around the 50th percentile. At the latest visit she was tracking between the 50th and 85th percentile.

3. **What additional information would you consider?**
   - No additional information to slide 28

4. **What conclusions would you draw from the measurements and pattern of growth on the growth chart?**
   - Low concern for growth: measurements on all charts indicate variability in growth curve is normal. Although growth curve started to increase at six months of age, this is typical for formula-fed infants.

5. **How would you monitor growth and what actions/next steps would you take?**
   - Monitoring: Routine
     - Anticipatory Guidance:
       - Positive reinforcement of all practices doing well.
       - Provide advice and/or reinforce hunger and fullness cues to ensure overfeeding with formula in bottle is discussed.
       - Provide suggestions to make smaller bottles and place in fridge if baby indicates full and does not want to finish the bottle.
Case Study #3: Baby Lauren - 12 months
Case Study #3: Baby Lauren - 12 months
Case Study #4: Baby Jerold- 12 months old

Baby Jerold was born at term, measuring 44 cm in length and 2450 g in weight, with an unknown head circumference. Father reports that Jerold was below normal size for a full term baby. He was formula fed from birth and solids were introduced at four months. Jerold eats a variety of solid foods, is bottle fed with formula and is just starting to use a cup.

Other risk factors in the family include: single parent on social assistance and limited social support (is from another province). The parent lacks knowledge regarding normal child growth and development and recommended infant feeding practices. The child has had prenatal exposure to alcohol in first trimester of pregnancy. Jerold’s measurements are as follows:

<table>
<thead>
<tr>
<th>GESTATIONAL AGE AT BIRTH</th>
<th>37  WEEKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE</td>
<td>AGE</td>
</tr>
<tr>
<td>2009-01-21</td>
<td>Birth</td>
</tr>
<tr>
<td>2009-07-12</td>
<td>6 months</td>
</tr>
<tr>
<td>2009-10-20</td>
<td>10 months</td>
</tr>
<tr>
<td>2010-01-07</td>
<td>12 months</td>
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</tbody>
</table>

1. Which chart(s) would you use to monitor growth?

2. What pattern of growth are you seeing in this child?

3. How would you interpret the growth curve?

4. What additional information would you consider?

5. What conclusions would you draw from the measurements and pattern of growth on the growth chart?

6. How would you monitor growth and what actions/next steps would you take?
Case Study #4: Baby Jerold- 12 months old

Answer guide:

1. **Which chart(s) would you use to monitor growth?**
   - Boys – Birth -24 months Length-for-Age and Weight-for-Age percentiles
   - Boys – Head Circumference and Weight-for-Head percentiles

2. **What pattern of growth are you seeing and how would you interpret the growth curve?**
   - **Length-for-Age** growth curve is consistently below the 0.1 percentile.
   - **Weight-for-Age** growth curve shifted from the 3rd percentile to the 0.1st percentile over the first six months. The last two months, the growth curve appears flat for Jerold.
   - **Head Circumference** growth curve shifted downwards from the 15th percentile to the 3rd percentile over the past two months. Head circumference did not increase over the past two months.
   - **Weight-for-Length** growth curve shifted from the 50th percentile to the 15th percentile. Weight-for-Length has not increase over the past two months, indicating a flat growth line.

3. **What additional information would you consider?**
   - Has the infant been seen by a physician? If so, when was last assessment?
   - Infant feeding method and nutritional intake
   - Child’s health and information about the mother
   - Stress or change in the child’s life or family situation
   - Recent acute or chronic illness
   - What supports would the father like or accept?

4. **What conclusions would you draw from the measurements and pattern of growth on the growth chart?**
   - High concern for growth: Weight-for-Age and Weight-for-Length has flat-lined over the past two months. Length-for-Age is tracking below the 0.1st percentile and Weight-for-Age is tracking below the 3rd percentile. Previous history of alcohol exposure during pregnancy is also a concern.

5. **How would you monitor growth and what actions/next steps would you take?**
   - Monitoring: Frequent;
   - Referral for medical investigation is required based on flat growth line and exposure to alcohol in pregnancy

   **Anticipatory guidance:**
   - Based on indication of exposure to alcohol in pregnancy refer to physician for diagnostic follow up
   - Public health nurse follow up and community support
   - Consult with Dietitian for feeding and nutrition
   - Develop trusting relationship with family
   - Provide information and resources to parent, including reminders to return for appointments and monitoring
Case Study #4: Baby Jerold - 12 months old

<table>
<thead>
<tr>
<th>Date</th>
<th>Age (Months)</th>
<th>Length (in)</th>
<th>Weight (lb)</th>
<th>Comments</th>
</tr>
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**WHO GROWTH CHARTS FOR CANADA**

**BIRTH TO 24 MONTHS: BOYS**

Length-for-age and Weight-for-age percentiles

<table>
<thead>
<tr>
<th>Birth</th>
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<th>4</th>
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<td>61</td>
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</table>

**Name:**

**DOB:**

**Record #:**
Case Study #4: Baby Jerold – 12 months old
Case Study #5: Baby Georgia- 13.5 months of age

Baby Georgia was born at term, measuring 49 cm in length, 3076 g in weight, with a head circumference of 34 cm. She was breastfed exclusively from birth and introduced to solids at six months. Georgia is meeting all developmental milestones and does not have a history of allergies or recent illness. Mother and father are small in stature.

Georgia’s measurements are as follows:

<table>
<thead>
<tr>
<th>GESTATIONAL AGE AT BIRTH</th>
<th>39 WEEKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE</td>
<td>AGE</td>
</tr>
<tr>
<td>2009-01-01</td>
<td>BIRTH</td>
</tr>
<tr>
<td>2009-01-23</td>
<td>3 weeks</td>
</tr>
<tr>
<td>2009-03-03</td>
<td>2 months</td>
</tr>
<tr>
<td>2009-05-05</td>
<td>4 months</td>
</tr>
<tr>
<td>2009-07-05</td>
<td>6 months</td>
</tr>
<tr>
<td>2010-01-07</td>
<td>12 months</td>
</tr>
<tr>
<td>2010-02-20</td>
<td>13.5 months</td>
</tr>
</tbody>
</table>

1. Which chart(s) would you use to monitor growth?

2. What pattern of growth are you seeing in this child?

3. How would you interpret the growth curve?

4. What additional information would you consider?

5. What conclusions would you draw from the measurements and pattern of growth on the growth chart?

6. How would you monitor growth and what actions/next steps would you take?
Case Study #5: Baby Georgia – 13.5 months

Answer guide:

1. **Which chart(s) would you use to monitor growth?**
   - Girls - Birth - 24 months Length-for-Age and Weight-for-Age percentiles
   - Girls - Head Circumference and Weight-for-Length percentiles

2. **What pattern of growth are you seeing and how would you interpret the growth curve?**
   - **Length-for-Age** shifted from the 50\(^{th}\) percentile to the 3\(^{rd}\) percentile over a 13 month period.
   - **Weight-for-Age** was initially at the 50\(^{th}\) percentile. After an increase in growth trajectory at 3 weeks of age, her weight shifted gradually over a 13 month period to track just above the 3\(^{rd}\) percentile at twelve months of age.
   - **Head Circumference** was at the 50\(^{th}\) percentile at birth.
   - **Weight-for-Length** growth curve tracks around the 50\(^{th}\) percentile then gradually shifts to the 15\(^{th}\) percentile.

3. **What additional information would you consider?**
   - See slide 29 for additional assessment information e.g. parent stature, Parent information on child’s growth, health, and eating, any special health care needs, recent acute or chronic illness, family food habits, meal patterns, food security, and history of disordered eating or stress or change in the child’s life or family situation.

4. **What conclusions would you draw from the measurements and pattern of growth on the growth chart?**
   - Baby Georgia’s Weight – for Age was initially at the 50\(^{th}\) percentile.

   After an initial expected weight gain at 3 weeks of age, her weight shifted gradually over a 14 month period to track just above the 3rd percentile after two months of age. Her length also shifted from the 50\(^{th}\) percentile to the 3\(^{rd}\) percentile over this same time period. Weight-for-Length shows initially at the 50\(^{th}\) percentile then gradually shifts to the 15\(^{th}\) percentile.

   It appears that Baby Georgia is shifting downwards and may elicit concern, based on the measurements and the time period, and no additional information gathered raised additional concerns, the growth curve may be normal. Monitoring is required to determine the next plot on the growth curve. If the plot is dropping again, further investigation is warranted.

   Important to note that when plotted on the CDC growth chart, this child was identified as failure to thrive at about six months of age and referred to the registered dietitian for further assessment of feeding.
5. **How would you monitor growth and what actions/next steps would you take?**
   Monitor Georgia to ensure that the growth trajectory is not continuing downward. If next plot is dropping, refer to physician for further investigation.

   - **Anticipatory Guidance:** Positive reinforcement on current feeding practices including continuing to breastfeed.
   - Confirm positive feeding relationship and encourage development of physical milestones.
Case Study #5: Baby Georgia – 13.5 months
Case Study #5: Baby Georgia – 13.5 months
Case Study #5: Baby Georgia – 13.5 months

For your reference, the following shows the variation between the CDC and the WHO ‘Weight-for-Age’ growth chart for an exclusively breastfed baby with introduction of solids at the appropriate time.
Case Study #6: Evan- 5 years old

On September 10, 2010, a mother approaches you at a kindergarten health fair and says she notices her 5 year old son Evan is the same height as most of the other boys but appears to be much bigger. She is concerned that Evan is gaining too much weight. She states her family doctor had not mentioned any health concerns in the past. You note this mother is approximately 5’ 10’’. The mother agrees to come to the health unit later that day and have Evan’s height and weight measured. At today’s assessment he weighs 23.5 kilograms and his height is 112 cm. Evan’s measurements are as follows:

<table>
<thead>
<tr>
<th>GESTATIONAL AGE AT BIRTH</th>
<th>41 WEEKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE</td>
<td>AGE</td>
</tr>
<tr>
<td>2005-06-12</td>
<td>Birth</td>
</tr>
<tr>
<td>2006-06-20</td>
<td>1 year</td>
</tr>
<tr>
<td>2007-06-14</td>
<td>2 years</td>
</tr>
<tr>
<td>2008-09-03</td>
<td>3 years</td>
</tr>
<tr>
<td>2009-08-02</td>
<td>4 years</td>
</tr>
<tr>
<td>2010-09-12</td>
<td>5 years</td>
</tr>
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</table>

1. Which chart(s) would you use to monitor growth?
2. What additional information would you consider?
3. How would you interpret the growth curve?
4. What conclusions would you draw from the measurements and pattern of growth on the growth chart?
5. How would you monitor growth and what actions/next steps would you take?
Case Study #6: Evan- 5 years old
Answer guide:

1. **Which chart(s) would you use to monitor growth?**
   2-19 years: Boys – BMI-for-Age percentiles
   2-19 years: Boys – Height-for-Age and Weight-for-Age percentiles

2. **What additional information would you consider?**
   - Information from slide 28 with emphasis and additional information as follows:
     - Father’s height and size and sibling height and sizes
     - Family feeding practices (meals, snacking etc)
     - Level of physical activity
     - Stress or change in the child’s life or in the family situation
     - Genetic and cultural background
     - Child’s health status
     - Any previous medical history in child or family

3. **How would you interpret the growth curve?**
   **Height-for-Age** growth curve is tracking consistently at the 50th percentile.
   **Weight-for-Age** growth trajectory is shifting from just above the 50th percentile, crossing almost two percentiles to just below the 97th percentile.
   **BMI-for-Age** started at the 50th percentile and by age 5, from a consistent upward growth trend, Evan’s BMI plotted between the 97th percentile and the 99.9th percentile. At the 18 month plot, the BMI is greater than the 97th percentile indicating an overweight classification, with a shifting trend towards the obese classification.

   **What conclusions would you draw from the measurements and pattern of growth on the growth chart?**

   Indicates need for further assessment. BMI- for-Age between the 85th and the 97th percentile is categorized as overweight.

4. **How would you monitor growth and what actions/next steps would you take?**

   Monitoring: Frequent; medical investigation may be recommended based on additional information from parents to assess if weight change is unexplained by assessment of nutrition and feeding practices and levels of physical activity, screen time.

   Anticipatory guidance:
   - Refer to Dietitian Services at HealthLinkBC (8-1-1) for support for eating and feeding practices
   - Provide resources to the parent (e.g. websites from Resources for Parents in Appendix F)
Case Study #6: Evan - 5 years old

WHO GROWTH CHARTS FOR CANADA

2 TO 19 YEARS: BOYS
Height-for-age and Weight-for-age percentiles

NAME: ____________________________
DOB: ____________________________
RECORD #: _______________________

SOURCE: The main chart is based on World Health Organization (WHO) Child Growth Standards (2006) and WHO Reference (2007) adapted for Canada by Canadas Pediatrician Society and Canadian Pediatrics Society, College of Family Physicians of Canada, Community Health Nurses of Canada and Dietitians of Canada. The weight-for-age 10 to 18 years section was developed by OPED based on data from the U.S. National Center for Health Statistics using the same procedures as the WHO growth charts.

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Case Study #6: Evan - 5 years old

WHO GROWTH CHARTS FOR CANADA

2 TO 19 YEARS: BOYS

Body mass index-for-age percentiles

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<th>NAME:</th>
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<th>RECORD #:</th>
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<tr>
<th>DATE</th>
<th>AGE</th>
<th>WEIGHT</th>
<th>HEIGHT</th>
<th>BMI*</th>
<th>COMMENTS</th>
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BMI table calculator available at: www.who-growthcharts.ca
*To calculate BMI: Weight (kg) / Height (m)^2

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British Columbia WHO Growth Chart Training – August 2014
Staff Quiz

This quiz can be used as a pre test, a post test or as a pre and post test quiz for staff to reinforce learning from the PowerPoint and the appendices information.

1. Serial measurements are necessary for identification of growth trends in children. TRUE / FALSE

2. The WHO Child Growth Standards illustrate how healthy children should grow, whereas the CDC charts portray how a sample of children did grow. TRUE / FALSE

3. Changes in weight or height need to be investigated after crossing two major percentile curves. TRUE / FALSE

4. The WHO Growth Standards are applicable to children of all ethnic backgrounds, as they have similar potential for growth when raised in environmental conditions favourable to growth. TRUE / FALSE

5. BMI-for-Age is an effective screening tool to identify potential wasting, overweight, and/or obesity in children 2-19 years old. TRUE / FALSE

6. The WHO Growth Standards can be used for premature infants. TRUE / FALSE

7. The WHO Growth Standards cannot be used to monitor growth of children with intellectual, developmental, genetic, or other disorders. TRUE / FALSE

8. A shift of how many major percentile curves is considered normal during the first two years of life and puberty?
   a) 1
   b) 2
   c) 3
   d) A and B

9. A growth line that crosses one major percentile curve with a shift away from the 50th percentile, may indicate:
   a) A high concern about growth
   b) A moderate concern about growth
   c) A low concern about growth
10. Using the WHO Growth Standards, formula-fed infants may have:
   a) A faster rate of weight gain in the first six months
   b) A slower rate of weight gain in the first six months
   c) A faster rate of weight gain after six months old
   d) B and C

11. A flat growth line in the first six months of life would be considered:
   a) A high concern about growth
   b) A moderate concern about growth
   c) A low concern about growth

12. A three year old child growing consistently between the 85th and the 97th percentiles on the WHO BMI-for-Age growth chart would be categorized as:
   a) Within normal range
   b) Risk of overweight
   c) Overweight
   d) Obese

13. A five year old boy growing consistently between the 85th and the 97th percentiles on the WHO BMI-for-Age growth chart would be categorized as:
   a) Within normal range
   b) Risk of overweight
   c) Overweight
   d) Obese

14. On the WHO growth charts, breastfed infants (born term) will tend to:
   a) No longer look as though they are growing too rapidly during the first six months
   b) Have a slight shift downwards in the weight-for-age percentiles in the first year
   c) Not look as if they are failing to grow adequately from six to twelve months
   d) A and B
   e) A and C

15. Which statement is not true? The WHO Growth Standards:
   a) Are based on a breastfed population
   b) Generally reflect a lighter, longer/taller sample of children
   c) Show a growth spurt at two years of age
   d) Represent children from six countries
16. The suggested growth monitoring intervals, for which the 2006 WHO Growth Standards were based on, are:
   a) At birth, within 1-2 weeks of birth, 2, 4, 6, 8, 10, 12, and 24 months, then once a year
   b) At birth, within 1-2 weeks of birth, 2, 4, 6, 9, 12, 18, and 24 months, then once a year
   c) At birth, within 1-2 weeks of birth, 2, 4, 6, 10, 14, 18, and 24 months, then once a year
   d) None of the above
Appendix C

Answers to Staff Quiz

   
   **Answer: True**
   Serial measurements are required to accurately monitor height and weight as they show the trajectory of growth for a child.
   Slide: 6, 19
   Learning objective: 1

2. The WHO Child Growth Standards illustrate how healthy children *should* grow, whereas the CDC charts portray how a sample of children *did* grow.
   
   **Answer: True**
   The 2006 *WHO Child Growth Standards* for birth to 5 years illustrate how healthy children *should* grow and are recommended because:
   - they are based on children raised according to current Canadian and international health and nutrition recommendations
   - establish growth of the breast fed infant as the norm for growth
   In comparison, the CDC charts provided a “snapshot of growth” portraying how a sample of children *did* grow.
   Slide: 12
   Learning objective: 2

3. Changes in weight or height need to be investigated after crossing two major percentile curves.
   
   **Answer: False**
   Changes in weight or length/height should be investigated before a child crosses two major percentile curves.
   Slide: 37, 38
   Learning objective: 2, 4

4. The WHO Growth Standards are applicable to children of all ethnic backgrounds, as they have similar potential for growth when raised in environmental conditions favourable to growth.
   
   **Answer: True**
   In the WHO Multicentre Growth Reference Study, in spite of differences in racial and ethnic background, there were minimal differences in the rates of linear growth observed among the 6 different countries. This strengthens the evidence that children of all ethnic backgrounds have similar potential for growth when raised in environmental conditions favourable to growth, particularly smoke-free households, and access to health care and good nutrition. The WHO Growth Standards embody optimal growth and, as such, depict the rate of growth that should serve as a goal to describe healthy Canadian infants and children to achieve, regardless of ethnicity, socioeconomic status, and type of feeding.
   Slide: 13 Learning objective: 1, 2
5. BMI-for-Age is an effective screening tool to identify potential wasting, overweight, and/or obesity in children 2-19 years old.

Answer: True
BMI-for-Age is the recommended nutritional indicator for screening children two years and older to identify individuals who are potentially wasted, overweight or obese. BMI is not a diagnostic tool.

Slide: 17
Learning objective: 4

6. The WHO Growth Standards can be used for premature infants.

Answer: True
The new WHO growth standards can be used for preterm infants. A preterm is defined as an infant born at less than 37 weeks gestation.

Slide 15, 22
Learning objective: 1, 2

7. The WHO Growth Standards cannot be used to monitor growth of children with intellectual, developmental, genetic, or other disorders.

Answer: False
WHO growth charts can be used to assess growth patterns for children with intellectual, developmental, genetic or other disorders.

Slide: 16
Learning objective: 1

8. A shift of how many major percentile curves is considered normal during the first two years of life and puberty?

a) 1
b) 2
c) 3
d) A and B

Answer: d) A and B
Slide 30
Learning objective: 2, 4

9. A growth line that crosses one major percentile curve with a shift away from the 50th percentile, may indicate:

a) A high concern about growth
b) A moderate concern about growth
c) A low concern about growth

d) A and B

Answer: b) A moderate concern about growth
Slide: 34
Learning objective: 4
10. Using the WHO Growth Standards, formula-fed infants may have:
   a) A faster rate of weight gain in the first six months
   b) A slower rate of weight gain in the first six months
   c) A faster rate of weight gain after six months old
   d) B and C

   Answer: d) B and C
   Slide: 14
   Learning objective: 1, 2

11. A flat growth line in the first six months of life would be considered:
   a) A high concern about growth
   b) A moderate concern about growth
   c) A low concern about growth

   Answer: a) A high concern about growth
   Slide: 33, 36, 39
   Learning objective: 4

12. A three year old child growing consistently between the 85th and the 97th percentiles on the WHO BMI-for-Age growth chart would be categorized as:
   a) Within normal range
   b) Risk of overweight
   c) Overweight
   d) Obese

   Answer: b) Risk of overweight
   Slide: 32
   Learning objective: 4

13. A five year old boy growing consistently between the 85th and the 97th percentiles on the WHO BMI-for-Age growth chart would be categorized as:
   a) Within normal range
   b) Risk of overweight
   c) Overweight
   d) Obese

   Answer: c) Overweight
   Slide: 32
   Learning objective: 4

14. On the WHO growth charts, breastfed infants (born term) will tend to:
   a) No longer look as though they are growing too rapidly during the first six months
   b) Have a slight shift downwards in the weight-for-age percentiles in the first year
   c) Not look as if they are failing to grow adequately from six to twelve months
   d) A and B
   e) A and C

   Answer: A and C
   Slide: 14
   Learning objective: 2, 4
15. Which statement is not true? The WHO Growth Standards:
   a) Are based on a breastfed population
   b) Generally reflect a lighter, longer/taller sample of children
   c) Show a growth spurt at two years of age
   d) Represent children from six countries

   Answer: c) Show a growth spurt at two years of age

   Slide: 13
   Learning objective: 1, 2

16. The suggested growth monitoring intervals, for which the 2006 WHO Growth Standards were based on, are:
   a) At birth, within 1-2 weeks of birth, 2, 4, 6, 8, 10, 12, and 24 months, then once a year
   b) At birth, within 1-2 weeks of birth, 2, 4, 6, 9, 12, 18, and 24 months, then once a year
   c) At birth, within 1-2 weeks of birth, 2, 4, 6, 10, 14, 18, and 24 months, then once a year
   d) None of the above

   Answer: b) At birth, within 1-2 weeks of birth, 2, 4, 6, 9, 12, 18, and 24 months, then once a year

   Slide: 19
   Learning objective: 1, 2
Resources for Parents

Brochures
Healthy Weights for Children (2 to 5 years) - Available in English, Chinese, French, Punjabi and Spanish
http://www.bcchildrens.ca/Services/SpecializedPediatrics/CentreHealthyWeights/ForFamilies/TipSheets.htm

Handbooks on general parenting information from pregnancy to 36 months of age
Baby’s Best Chance: A Parent’s Handbook of Pregnancy and Baby Care (up to 6 months of age)
Toddler’s First Steps: A Best Chance Guide to Parenting Your 6- to 36-Month-Old Child

Websites that provide healthy eating and general health information
- HealthLinkBC  http://www.healthlinkbc.ca/ or call 8-1-1. For deaf and hearing impaired assistance (TTY), call 7-1-1. Translation services are available in over 130 languages on request
- HealthyFamiliesBC  https://www.healthyfamiliesbc.ca/parenting
- Canadian Pediatric Society  http://www.cps.ca/english/index.htm
- Childhood Obesity Foundation  http://www.childhoodobesityfoundation.ca
- Shapedown Weight Management for Children and Adolescents (lower mainland)
  http://www.bcchildrens.ca/KidsTeensFam/HealthyWeights/Services/ShapedownBC.htm
- Physical Activity Line  http://physicalactivityline.com/ Phone: (Toll Free) 1-877-725-1149 or lower mainland 604-241-2266; Monday to Friday 9:00 am – 5:00pm

Books on how to support healthy feeding
Note: The feeding recommendations for introduction of solids in these books do not match Health Canada guidelines. These books provide good information on ‘how’ to feed children. For guidelines on introduction of foods see BC Health files # 69c called “Baby’s First Foods” available at www.healthlinkbc.ca/healthfiles/hfile69c.stm
- Authored by Ellyn Satter:
  - Child of Mine: Feeding with Love and Good Sense
  - How to Get Your Kid to Eat: But Not Too Much
  - Your Child’s Weight: Helping without Harming
  - Secrets of Feeding a Healthy Family: Orchestrating and Enjoying the Family Meal
- Authored by Louise Lambert-Lagacé:
  - Feeding Your Baby: From Conception to Age Two
  - Feeding Your Baby the Healthiest Foods: From Breastmilk to Table Foods
  - Feeding Your Preschooler: Tasty Nutrition for Kids Two to Six

Dietitian Information
- Call 8-1-1 and ask to speak to a Registered Dietitian at HealthLinkBC  www.healthlinkbc.ca
- For a list of Private Practice Dietitians, log on to www.dietitians.ca
- To determine if a dietitian is registered to practice in British Columbia, log on to:
  (https://pacific.alinity.com/cdbc/webclient/publicregister.asp)
Resources for Health Care Providers

Publications

- Neonatal Guideline: Newborn Nursing Care Pathway  
  [http://www.perinatalservicesbc.ca/List%20of%20Guidelines.htm](http://www.perinatalservicesbc.ca/List%20of%20Guidelines.htm)
- Healthy Weights for Children (2 to 5 years)- Available in English, Chinese, French, Punjabi and Spanish  
  [http://www.bcchildrens.ca/Services/SpecializedPediatrics/CentreHealthyWeights/ForFamilies/TipSheets.htm](http://www.bcchildrens.ca/Services/SpecializedPediatrics/CentreHealthyWeights/ForFamilies/TipSheets.htm)

Training Modules

- World Health Organization training module  
  [www.who.int/childgrowth/training/module_b_measuring_growth.pdf](http://www.who.int/childgrowth/training/module_b_measuring_growth.pdf)
- Centre for Disease Control Training  
  [www.cdc.gov/nccdphp/dnpao/growthcharts/training/index.htm](http://www.cdc.gov/nccdphp/dnpao/growthcharts/training/index.htm)

Websites

- HealthLinkBC  
  [http://www.healthlinkbc.ca/](http://www.healthlinkbc.ca/)  
  Phone: Dial 8-1-1. For deaf and hearing impaired assistance (TTY), call 7-1-1  
  Translation services are available in over 130 languages on request
- Rourke Baby Record  
  [http://www.rourkebabyrecord.ca/](http://www.rourkebabyrecord.ca/)
- Grieg Health Record  
  [http://www.cps.ca/english/statements/cp/preventiveCare.htm](http://www.cps.ca/english/statements/cp/preventiveCare.htm)
- College of Family Physicians of Canada  
  [http://www.cfpc.ca/Home/](http://www.cfpc.ca/Home/)
- Dietitians of Canada  
  [http://www.dietitians.ca/](http://www.dietitians.ca/)
- Childhood Obesity Foundation  
  [http://www.childhoodobesityfoundation.ca/programsAndResources](http://www.childhoodobesityfoundation.ca/programsAndResources)
- Ellyn Satter  
- Motivational Interviewing  
  [www.motivationalinterviewing.org/](http://www.motivationalinterviewing.org/)
- Families Eating Together  
  [www.eattogether.net](http://www.eattogether.net)
- Physical Activity Line  
  Phone: (Toll Free) 1-877-725-1149 or lower mainland 604-241-2266;  
  Monday to Friday 9:00 am – 5:00pm
- For a list of Private Practice Dietitians, log on to  
  [www.dietitians.ca](http://www.dietitians.ca)
- To determine if a dietitian is registered to practice in British Columbia, log on to:  
  (https://pacific.alinity.com/cdbc/webclient/publicregister.as)

BC Programs

- Shapedown Weight Management for Children and Adolescents (lower mainland)  
  [http://www.bcchildrens.ca/KidsTeensFam/HealthyWeights/Services/ShapedownBC.htm](http://www.bcchildrens.ca/KidsTeensFam/HealthyWeights/Services/ShapedownBC.htm)
Tools and Techniques for Measuring Growth

The following is a review of tools and techniques required for measuring growth.

Accurate and reliable measurements are fundamental and require:

• A standardized measurement technique
• High quality equipment that is accurate and regularly calibrated
• Trained measurers who are consistent and precise in technique.

Measuring Infants (Birth to 24 months)

Take the measurements of a child wearing a dry diaper only.

To measure weight, weigh on a calibrated scale.

To measure length:

• Use a calibrated length board with 2 trained people. One person at each end of the child.
• Holding the head from above. Stretch the child out so the body lays flat. Feet should be flat and pressed up against the measuring board prior to taking measure.
• Measure to nearest 0.1 cm

Measuring Head Circumference (Birth to 24 months)

Head circumference is measured with a narrow plastic or disposable paper tape.

Position the tape just above the eyebrow, above the ears and around the biggest part of the back of the head.
Measure to nearest 0.1 cm.
Appendix F

Weighing Children and Adolescents (Older than 24-36 months)

Child should be weighed:

- wearing light undergarments or lightweight outer clothing (consistency is what is important)
- standing on a beam-balance or digital scale
- Weight is recorded to the nearest 0.1 kg

Children unable to stand unsupported may need to be weighed held by someone, with the weight of the person holding the child subtracted from their combined weight.

Measuring Height in Children and Adolescents (Over 24 months)

Children from 24-36 months may have either height or length measured.

When measuring use a stadiometer for children who can stand unassisted:

- The child stands against the stadiometer without shoes, with heels together, legs straight, arms at sides, shoulders relaxed.
- Ensure that child is looking straight ahead.
- Bring perpendicular headpiece down to touch the crown of the head. Measurer’s eyes are parallel with the headpiece.
- Measure to the nearest 0.1 cm

Children unable to stand may require length measured using a recumbent board or may require the usage of other segment length measurements.
Evaluation Form

**Training Module Objectives:**

- I have increased my understanding of the new WHO Growth Charts and the importance of serial measurements
- I have increased my understanding of the differences between Centre for Disease Control (CDC) growth charts and WHO Growth Standards
- I have increased my understanding of the tools required to accurately measure weight, height/length, and head circumference
- I have increased my understanding of how to accurately measure weight, height/length, and head circumference
- I have increased my understanding of how to plot on the appropriate growth chart
- I have increased my understanding of how to interpret results and refer growth concerns
- I have increased my understanding of the resources available
- I have increased my understanding of how to communicate with parents/caregivers

**PowerPoint Presentation**

- Increased my knowledge and/or skills
- I will be able to make use of this learning

**Case Studies**

- Increased my knowledge and/or skills
- I will be able to make use of this learning

**Resource Package**

- Increased my knowledge and/or skills
- I will be able to make use of this learning

**Session Overall**

- The session was relevant to my needs
- It increased my knowledge and/or skills
- I will be able to make use of this learning
- I feel confident in the use and understanding of the new WHO Growth Standards
Appendix G

What did you value most from the session?

What did you value least?

What additional information would you like?

Any other comments:
Available WHO Growth Charts in Canada

All growth charts can be downloaded from the Dietitians of Canada website http://www.whogrowthcharts.ca
WHOA GROWTH CHARTS FOR CANADA

2 TO 19 YEARS: GIRLS

Body mass index-for-age percentiles

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BMI table/calculator available at www.whogrowthcharts.ca

To calculate BMI: Weight (lbs) / Height (in) x 2.54 = Height (cm) / 10,000. OR

Weight / Height (in) x 2.54 = Height (cm) / 703

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## WHO GROWTH CHARTS FOR CANADA

### 2 TO 19 YEARS: BOYS

Body mass index (BMI) for age percentiles

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*To Calculate BMI: 

\[
BMI = \frac{Weight\ (kg)}{Height\ (m)^2} \times 10,000 \times 100
\]

BMI calculator available at www.whogrowthcharts.ca

**BOYS**


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